

Purpose of the use of technologies in the contemporary models of Corporate University

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Abstract

This paper aims to identify the purpose of the use of technologies in the contemporary models of corporate university: Stakeholder University (SU) and Networked Corporate University (NCU). To accomplish it, we carried out a systematic search in the main electronic bases of scientific documents, categorizing the studies by means of the revised Bloom's Taxonomy. This search enabled to distinguish the purpose of the use of technologies in corporate universities, such as the purpose of integration between different stakeholders in relation to knowledge. The research highlights the Corporate University in addition to an environment of education; but an area of innovation in which the integration of stakeholders, university and organization constitutes an important interaction and sharing networks. By identifying the technological characteristics and tools, it points out new approaches of technological integration in the mediation between stakeholders in order to promote networked learning. That is, to remember,

understand, apply, analyze, evaluate, and create (Bloom's Taxonomy), but, especially, to generate value from these relationships. The conclusion is that the distance education technologies, the knowledge media, and the engineering and knowledge management tools arise as enablers of the purpose of creating technologies to generate shared knowledge and stakeholder interaction, according to the models of SU and NCU.

Keywords: Corporate University. Stakeholder University. Networked Corporate University. Technologies. Knowledge Management.

Introduction

The discussions for a corporate education system aligned to organizational strategy led to the setting of models called corporate universities. These models meet the competitive requirements imposed by the knowledge society (Yeh, Huang, & Yeh, 2011) with regard to educational and social interactions of the participants of the organizational value chain (Narasimharao, 2009).

The Corporate University is regarded by Meister (1998, p. 8) as a "strategic umbrella for the development and education of employees, customers and suppliers, seeking to optimize the organizational strategies, in addition to a learning ". For Meister (1998, p. 15), a model of networked learning reinforces that "the decisive competitive differential lies in the level of training [...] of its employees, suppliers, customers, and even members of the communities where they operate ".

Margherita and Secundo (2009) support with this line of thought, pointing out that the contemporary format of a Corporate University requires strategic alignment beyond the limits of the Organization, since the extended operation established by the globalization of business imposes the provision of networked learning. In this new social characterization, the permeability of knowledge permeates organizational borders under the purpose to reach all parties involved and concerned, namely, the so-called stakeholders.

Thus, it is necessary the implementation of new corporate education systems recognize and integrate the stakeholders to the educational process, not only as production partners, but mainly in the development of a learning network. To this end, to define the educational programs and related courses, one should consider dynamic networked learning spaces, including employees, suppliers and customers, but also, that are recognized academic universities, and the participants of the productive and social arrangements of the organizational ecosystem (Freire, Dandolini, Sharma, Trierweiller, Silva, Sell, & Steil, 2016).

One of the most recent documents on the corporate University theme registered in the Scopus database is the article by Freire et al. (2016A). The article builds the identity model of the Networked Corporate University (NCU), from the Stakeholder University model of Margherita and second (2009), considering the guidelines for the deployment of authors such as Allen (2002), Dealtry and Rademakers (2005), Abel and Li (2012), Freire et al. (2016), Pacheco et al. (2015), and, finally, Antonelli, Cappiello and Pedrini (2013).

Among points that are still to be explored by science, for the best configuration of a networked corporate university model, one can point to a specific challenge related to the network learning

characteristics required by the Knowledge Society, which is the recognition and inclusion of stakeholders in the educational process of corporate universities. So how to create this learning network by promoting the inclusion of stakeholders in the educational process of corporate universities?

It is known that the effective inclusion of geographically dispersed individuals and groups depends on the use of technologies. The technologies play a key role (Cifuentes, 2016) and are decisive for the consolidation of an inclusive system, for its inexhaustible possibilities of building resources that facilitate access to information, curriculum content and Knowledge in general, on the part of the diversity of people interested (Giron, Poker, & Omote, 2012) in creating a Collaborative Learning Network (Fu & Hwang, 2018).

Following this line of thought, it can be considered that the new models of corporate university, such as SU and NCU, who want to offer educational programs to individuals and groups internal and external to the organization, are directly dependent on tools that facilitate the effective approximation of all the participants of the organizational ecosystem for the formation of the network learning. Or rather, they are dependent on inclusive, integral and interactive technologies as strategic drivers of the intermediation of dialogue between the corporate university and the stakeholders of the organization of which they are part (Freire et al., 2016a).

It is in this context of advancing approaches on the corporate education system that the purposes of using new technologies by corporate University models should be investigated. Therefore, this article aims to identify the purpose of the use of technologies by the contemporary models of corporate University: Stakeholder University (SU) and the Networked Corporate University (NCU).

To do this, a systematic search is done on the main electronic bases of scientific documents, categorizing studies from the revised Bloom's Taxonomy by Anderson, Krathwohl and Bloom (2001), which allows discerning the main purposes of use of technologies. Therefore, the relevance of this research is justified by the topicality of the discussion in addressing technologies as facilitating tools of one of the newest corporate education systems proposed by the scientific literature: Networked Corporate University (NCU), or, the Corporate University in Network (CUN) (Freire, 2017a; Freire, 2017b).

This paper is structured in sequential sections based initially on a theoretical reference, which includes the discussion of corporate learning and the Networked Corporate University (NCU). In the following, the methodological procedures of the systematic search are presented, considering the key terms and the research bases. Then two analyses are presented, one bibliometric and one descriptive. In the Bibliometric analysis the resulting portfolio highlights the initial perceptions about the main articles in the area. And in the descriptive analysis, the articles are discussed and characterized in a classification based on the objectives of the technologies for the corporate University. Thus, expectations are described in relation to the NCU theme and technologies, ending with the identification of the identified gaps.

Theoretical Reference

Corporate Network-based Learning

Today, the base generating the wealth of nations is made up of its social organization and its creator knowledge. In this environment, the Corporate University (CU) appears as a subject of interest, mainly in companies concerned with competitiveness (Eboli, 2010).

In this context, it is interesting to understand the evolution of corporate learning until the emergence of the CU concept. For this, Margherita and second (2009, p. 178) frame the models of corporate learning in three stages: (1) "Education and training; (2) Corporate education; and (3) network learning".

The first stage, according to the authors, begins in 1920 and has as characteristic the instruction of the employees as to the improvement of the skills to perform operational functions. Thus, considering this first stage as the origin of CU, it originates in the training and development centers (T&D).

Stage 2 begins to emerge in the late 1950, with the first corporate education centers of General Motors and McDonald's. In addition to the operational training, these centers had as main objective to align the operation of the business with the organizational strategy (Margherita & Secundo, 2009)

Still in these authors' view, the beginning of Stage 3 happens when, in the 1970s, the need to go beyond the T&D, developing capacities, skills and operational attitudes, tactics and strategic, emerge programs as Total quality, Development of leadership and professionalization of the supply chain. Thus, corporate education has evolved into the Corporate University configuration.

Since then, some models have been created and have evolved the terms of learning and corporate university. One of the most recent is precisely Margherita and Secundo's (2009), with the Stakeholder University (SU).

In their model (Figure 1), the authors bring the idea of four archetypes: 1) Department of Training; 2) e-learning platform; 3) Corporate University; and 4) Stakeholder University. Thus, learning evolves from a departmental level to the stakeholder University, where learning is networked and has as its main characteristic the high degree of interconnection and collaboration among stakeholders, establishing an environment conducive to Value creation. These stakeholders include the employees, suppliers, and all participants in their collaborative Learning Network (Fu & Hwang, 2018).

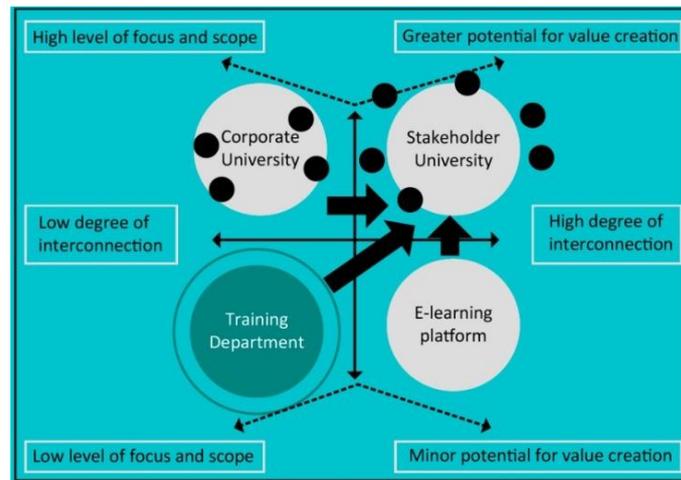


Figure 1 - Archetypes of corporate learning and value creation potential

Source: Margherita & Secundo (2009, p. 174).

The University Stakeholder therefore is characterized by three determinants (Margherita & Secundo, 2009; 2011):

1. Strategic alignment: strategic objectives of development of human capital, through a tight integration of research, skills development and knowledge management. As a result, the learning and development strategies should be constantly aligned to business strategy;
2. Extended Network: extended involvement of a wide range of stakeholders, recognizing the centrality of social capital development and inter-organizational relationships, in addition to human capital; and
3. Networked Learning: networked learning process, creation of knowledge and innovation based on relationships and interactions among stakeholders, through a new generation of collaborative technologies work and learning (Fu & Hwang, 2018).

Finally, for a CU to reach the Stakeholder University level (SU) it needs to build essential characteristics of its identity on networked learning, denouncing the demand for a Networked Corporate University (NCU) (Freire et Al., 2016). This model NCU aggregates to SU, two (02) other approaches of knowledge management, which were dealt with the perception of: (1) NCU as a memory-forming unit; and (2) knowledge engineering strategy for the exploitation of the NCU. This discussion is, though, detailed in the next section.

Networked Corporate University

With the significant change in relation to the outdated Training and Development Center (T&D), until attaining the Stakeholder University model of Margherita and Secundo (2009), the CU has reached a level of networked learning that is present through the plurality of involved entities. That way, each of the models offered by the academy, is thinking about the degree of cooperation that must build between

traditional and corporate universities (Freire et al., 2016a). Even more, according to EBOLI (2010), the organizations implementing the principles inherent in CU are creating a continuous learning system.

One of the latest approaches to the NCU (Freire et al., 2016a, Freire, Dandolini, Sharma, & Silva 2016b), that integrates with concept of networked learning, representing, in this way, the most advanced stage of corporate education system.

With the goal of strategic alignment between all stakeholders – internal and external participants and beneficiaries of productive and social clusters – of the organizational ecosystem, the NCU can be defined as an intelligent environment of continuing education, not necessarily in a physical environment, which manages and institutionalizes a networked learning culture. As such, its concept is based on the theories of the Social Constructivism (Vygotsky, 2007), Organizational Learning (Crossan, Lane, & White, 1999) and Andragogy (Knowles, 1973; 1990), using practices, techniques and tools of Knowledge Management and Engineering.

The NCU model includes in its programs all the involved in its collaborative network, pluralizing the actors concerning the acquisition, creation, transmission and sharing of knowledge in the different organizational levels: operational, tactical and strategic.

According to Freire et al. (2016a), the NCU advocates guidelines able to promote collective learning of knowledge essential to the success of the organizational strategy, in all its structural levels. NCU guidelines are:

- 1- Level Activities Involved (Allen, 2002);
- 2- The program's strategic focus (Dealtry & Rademakers, 2005);
- 3- Strategic focus of UC (Margherita & Secundo, 2009);
- 4- Archetype of UC (Margherita & Secundo, 2009);
- 5- UC factors (Abel & Li, 2012);
- 6- Comprehensiveness of the content Offered (Antonelli et al., 2013);
- 7- Knowledge management (Pacheco et al., 2015).

Among these, stands out the fourth guideline-Archetype of CU-derived of Margherita and Secundo (2009), which determines be you one of the drivers for the model reaches the high level of cooperation of the archetype Stakeholders University.

The first, the archetype of the "Personnel Department" has low use of collaboration technologies and, thus, is characterized by the lack of interconnection. Already the archetype "E-learning" is based on distance education technologies, with the aim of increasing the number of actors and the interaction between them, without impacting costs. Get greater flexibility and compatibility with work schedules, facilitating the training and the development of appropriate skills. The archetype "Corporate University" encompasses a range of supported learning initiatives at different levels of technologies; and some of the features the search for medium to high degree of interconnectivity, using knowledge management and distance education technology. The archetype "Stakeholder University" is characterized by high interconnection and embraces a wide range of stakeholders to use the "networked learning", based on engineering and media technologies of knowledge, which encourage collaboration in relationships and interactions of the authors.

With respect to the fifth guideline set by Freire et al. (2016a), based on Abel and Li (2012), among the priority factors for the CU, grouped by an empirical survey by the authors, the factor "technology to support learning" refers to programs to support learning through online technologies (EAD) and utilizes comprehensive learning management systems. Still on the search for Lui Abel and Li (2012), it was found that most of the CUs, for they surveyed, uses the technology in its operations. However, CU needs to identify the applicability of these processes to their own operations and in the context of its partner organizations.

According to Freire et al. (2016a), knowledge management (GC) adds two important focuses for NCU: first, the perception of NCU as a memory-forming unit; and, second, the knowledge engineering strategy for the exploitation of the NCU (Chu, Hwang, & Tsai, 2010). There are many terminologies relating to the organizational memory, specifically one as the notion of "repository", so the image memory store is widely accepted for literature of organizational memory systems, and also to the area of information systems. (Rowlinson, Booth, Clark, Delahaye, & Procter, 2009).

In this way, the guidelines brought by Freire et al. (2016A) also seek to form the memory of the Learning network. For this, it uses Knowledge Engineering (KE) tools for the instrumentalization of NCU.

The KE appeared in the 1960s with Artificial Intelligence, specifically with the development of specialist systems (Durkin & Durkin, 1998). Currently, it aims to provide methods and techniques to develop knowledge-based systems in a controllable and systematic manner (Schreiber, 2000; Studer, Decker, Fensel, & Staab, 2004).

Within the framework of NCU, Knowledge Engineering can be used with six objectives (Table 1):

Table 1 - Objectives of the Knowledge Engineering within a NCU

1	To guide the identification of the knowledge which is critical for the UC and the stakeholders that make up the organizational ecosystem.
2	To support the process of capturing, representing and structuring the knowledge which is critical for the CU and its network.
3	To define the strategies for the application of the technologies to support the activities of the CU and its stakeholders.
4	To guide the practices and techniques of intra- and inter-organizational communication for the sharing and dissemination of acquired knowledge.
5	To establish knowledge systems to support the processes of creating, sharing, structuring, disseminating and utilizing of knowledge in the organization and in the stakeholders that form the networked CU.
6	To support the implementation of the Knowledge Governance, which includes the Learning and Leadership Governance (Lui Abel & Li, 2012)

Source: Freire et al. (2016a).

According to Freire et al. (2016a), the KE proposes to meet the six objectives, depending on how strategically aligned the company is. For example, if the T&D area works as a training department, the KE

will only meet the objective of guiding the identification of the critical knowledge to be acquired. And the more the organization's corporate education system approaches the networked learning strategies, the more the KE will meet the six objectives described in Table 1.

In addition, Freire et al. (2016a) argue that by taking over the collective memory and knowledge engineering (Chu, Hwang, & Tsai, 2010) in the structure of elements of NCU, it is observed that the technology is related to the following guidelines of NCU: to form a computerized base with the expertise and knowledge produced by the stakeholders in the processes that permeate the organizational activities; and to align the application of the technologies according to the needs of the processes of knowledge management, at all levels of interaction between the stakeholders that form the NCU.

Finally, in Figure 2 the model proposed by Freire et al. (2016a) is presented which is structured in five levels. The first level, according to the authors, has the task of responding to the CU strategic issues that should be deployed and the task of defining the internal and external stakeholders. The second level refers to decision-making regarding all guidelines.

The third level requires the continuous check of the NCU operation as to: (1) The strategic alignment of promoted collective learning and the organizational strategy; (2) The development of social capital and interorganizational relationships; and (3) The offer of collaborative technologies of work and network Learning (Fu & Hwang, 2018). In the following, the fourth level gives attention to the demand of the Knowledge Society (Yeh, Huang, & Yeh, 2011) and at the fifth level there is the formulation of the identity of the NCU.

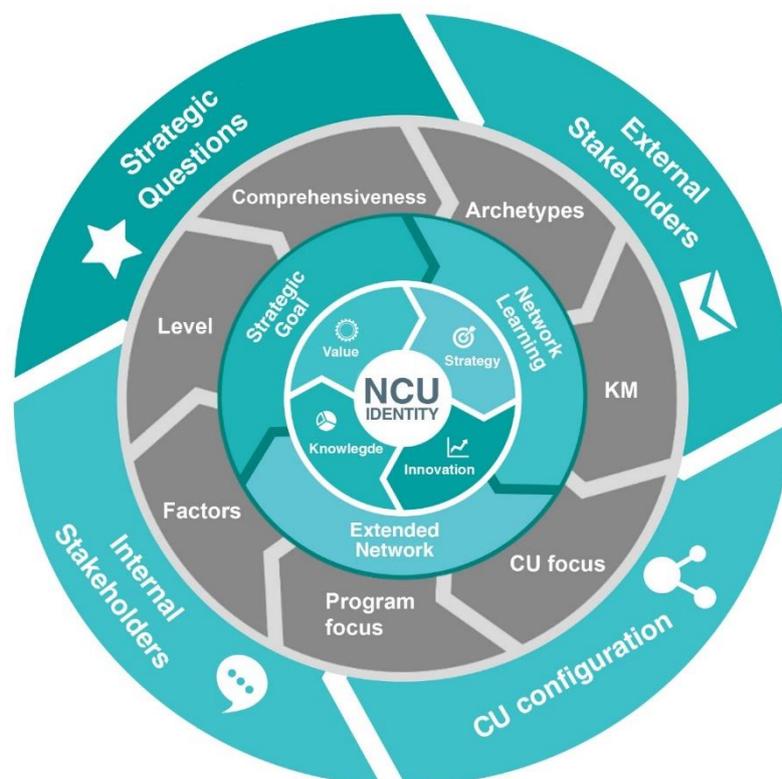


Figure 2 - Networked Corporate University Model Guidelines

Source: Freire et al. (2016a)

Methodological Procedures

To meet the goal of identifying the purpose of the use of technologies by contemporary models of corporate University (Stakeholder University and Networked Corporate University (NCU)) it was developed a descriptive exploratory research by using an integrative review (Beyea & Nicoll, 1998). The methodological approach is evident as quantitative Bibliometric analysis; and, also, qualitative, descriptive analysis on the goals and purposes of the documents raised.

Thus, the review carried out an analysis of existing scientific knowledge on the topics "Corporate University" and "technologies". The steps take place sequentially from the definition of the topic, elaboration of the research Question; search on electronic bases, based on sampling; criteria for categorization of studies, data filtering; the review included studies; discussion of the result; and, finally, the presentation of integrative review.

From the goals and key question, the English terms "corporate university" (or, in the plural, "corporate universities") were defined as search words, and the necessary filtering to approach the theme and goals set was carried out. The definitions of the search strategies were established in: (1) in the search fields; (2) filtering; and (3) previous results as described:

1) Search Fields: the survey was conducted on the basis of SCOPUS, the largest database of summary and citations of scientific papers (Falagas, Pitsouni, Malietzis, & Pappas, 2008). The search fields were the article title, abstract and keywords. The terms set out for the fields are key concepts for "Corporate University", establishing the search strategy: TITLE-ABS-KEY ("corporate universit *"), and 235 related articles were retrieved.

2) Filtragem: Não houve necessidade de filtragem durante a busca. A filtragem ocorreu apenas no gerenciador de bibliografias pela busca por: "tech*", a fim de encontrar termos relacionados à tecnologia.

2) Filtering: there was no need for filtering during the search. The filtering occurred only in the bibliographies manager by the search for: "tech *", in order to find terms related to technology.

3) Previous results: in total, 235 articles were published between 1983 and 2016, – with an average over the number of published in 2007 – of which, 100 documents between 1983 and 2007; and 135 between 2007 and 2016, which highlights the timeliness of the topic, since, in the last decade, there are already more documents than in the 25 previous years.

The search portfolio documents were exported to the bibliographies software manager EndNote®.

Results Analysis

After the survey, the data of the documents of the portfolio were extracted for Bibliometric analysis and descriptive. The Bibliometric analysis was performed with use of software Science of Science (Sci²), Gephi and Google Fusion. For the descriptive analysis were exported the data: title, author, year, and summary to a worksheet. The reading of the data was accompanied by the separation of the relevant data in the worksheet, whereas methodology and content. The content has been reviewed, in accordance with the goals set forth previously, being: purpose of the article, tools, purpose of use, technologies, concepts,

results, limitations and future works. After the separation of data and comparison of articles, generic findings were removed and treatment section-specific results.

The following are the results of the descriptive and bibliometric analyses.

Bibliometric Analysis

From the defined procedures, the portfolio resulting from the bibliographic survey obtained 235 documents, being: 132 articles, 32 revision documents, 29 conference articles, 24 book chapters and 10 books. The other documents: editorials (three documents), printed articles (two documents), notes (two documents) and questionnaires (one document) add up to eight documents, according to Figure 3.

In Figure 4, the subject areas are presented. The number of areas covered in the portfolio already shows the multidisciplinary of the theme, Social Sciences having the largest number of documents (39.1%); followed by the area of Companies, Business and Accounting (21.3%). However, it is also possible to understand the interdisciplinarity of the themes, and the portfolio presents 235 documents and the sum of documents in all areas reaches 348. This is because some documents are suitable for two or more areas.

However, in the area of Computer Science only 5.7% documents about CU are included in this field. This data represents the research deficit that involves Computer Science and consequently computational technologies for Corporate Universities.

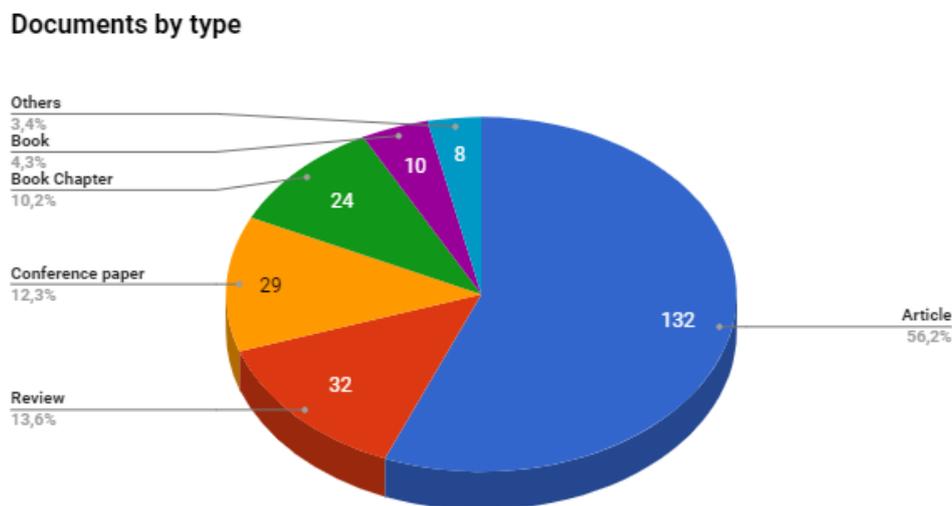


Figure 3 - Document by type

Source: Prepared by the authors, based on the research data.

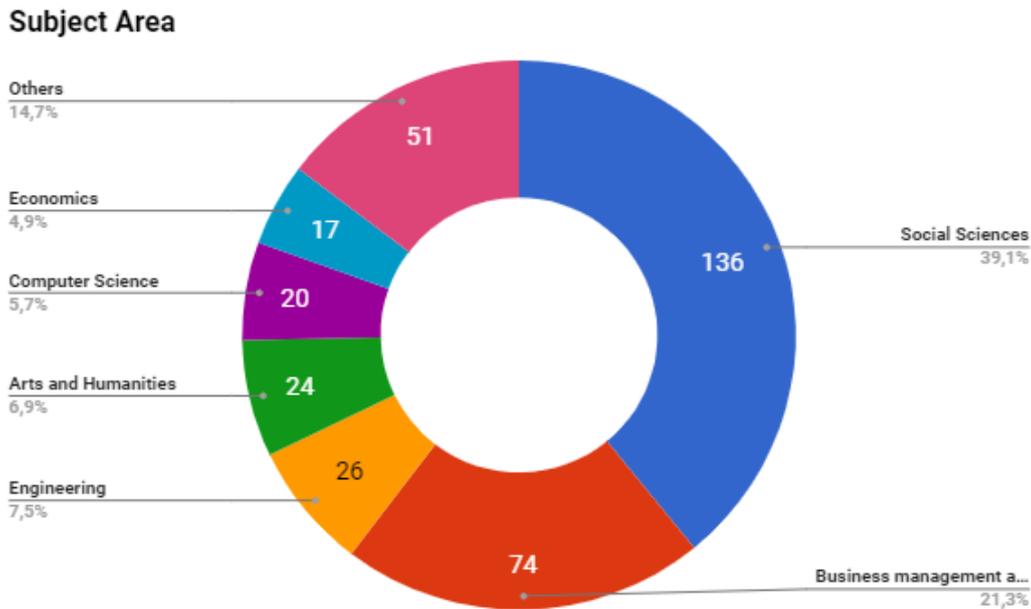


Figure 4 - Documents by subject area

Source: Prepared by the authors, based on the research data.

From Figure 5, it is possible to notice a breakthrough in the amount of documents per year, the rise beginning in 2000 and with the peak in 2005, and a significant decrease in the following year, but rising again in 2008 and, in recent years, maintaining stability. The data of 2016 are not complete, as the portfolio presents documents available on the basis only until the first quarter of 2016.



Figure 5 –Documents per year

Source: Prepared by the authors, based on the research data.

Documents by Souce

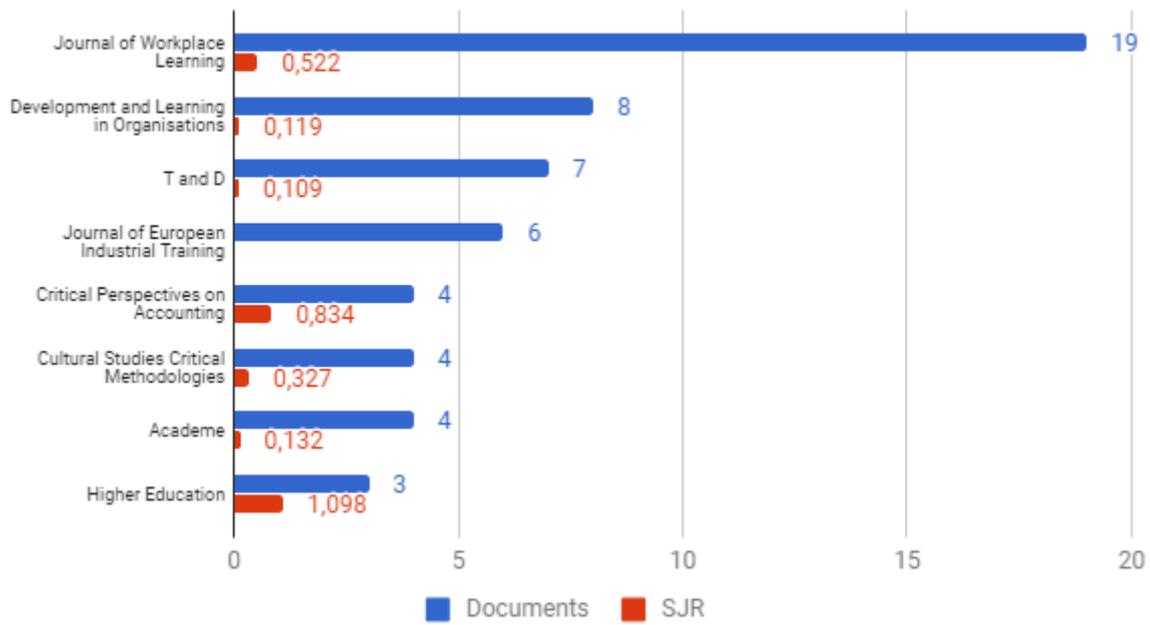


Figure 6 - Documents by source and its SJR index
Source: Prepared by the authors, based on the research data.

In addition to the documents by source and its SJR index (Figure 6), in which the leadership of the Journal of Workplace Learning is observed, a mapping of documents by country is presented from the Figure. In this mapping, the highlight is the English-speaking countries in order of classification: United States (70 documents) and United Kingdom (28 documents), followed by Australia and Canada, with 19 documents each. Brazil is the fifth with the largest number of documents in the area with 9 documents, ahead of Germany and Italy, both with 6 documents each. But still, it is possible to perceive a greater popularization of the research of the Corporate University in the more developed countries.

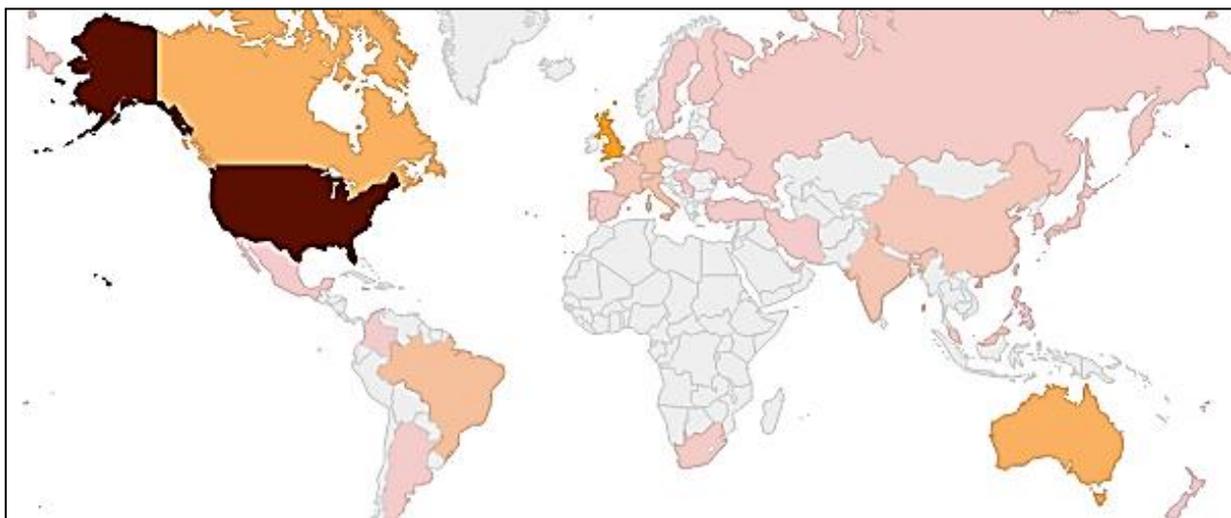


Figure 7-Publications by country
Source: Prepared by the authors, based on the research data.

From the analysis of the portfolio, the highlights of the set were identified according to the amount of quotations and/or documents. Initially, the authors' main institutions of affiliation are identified, and highlighted by the amount of documents. The Figure 8 represents the amount of documents by size of the sphere and also by the colors: green, orange and red, respectively: larger, medium and smaller amount. For the analysis, institutions with less than three articles were removed.



Figure 8 - Publications by authors' institution of affiliation

Source: Prepared by the authors, based on the research data.

The institutions with the largest number of articles published in the area are "Intellectual Partnerships Consulting Limited" (5 documents), "Swansea University" (4 documents), "Manchester Metropolitan University" (4 documents), "York University" (4 Documents) and "Indira Gandhi National Open University" (4 documents).

In Brazil, 30 authors have documents in the area. The authors are affiliated with nine different institutions, being Federal University of Rio de Janeiro, Rio de Janeiro State University, and Petrobras, with two documents each; and University Center Augusto Motta - UNISUAM, Severino Sombra University, São Paulo State University - USP, Federal University of Goiás, Federal University of Santa Catarina and Santa Catarina State University, with one document each. The types of documents are: journal articles (4 documents), conference articles (4 documents), and a book chapter

The main sources of these Brazilian documents on the theme are: "Revista Espacios", with two documents, "International Journal of Knowledge Culture and Change Management", "Proceedings of the Annual Offshore Technology Conference", and "Revista Brasileira de Gestão de Negócios", with one document each.

Continuing the portfolio analysis, Figure 9 presents the variation of the most cited documents: Grey (2001), Lawrence and Sharma (2002), Castree (1999), Keskin and Metcalf (2011), and Buchbinder (1993). In addition to these, two documents that have gained notoriety in the last 5 years are included: Boyce (2004) and Zammuto (2008)

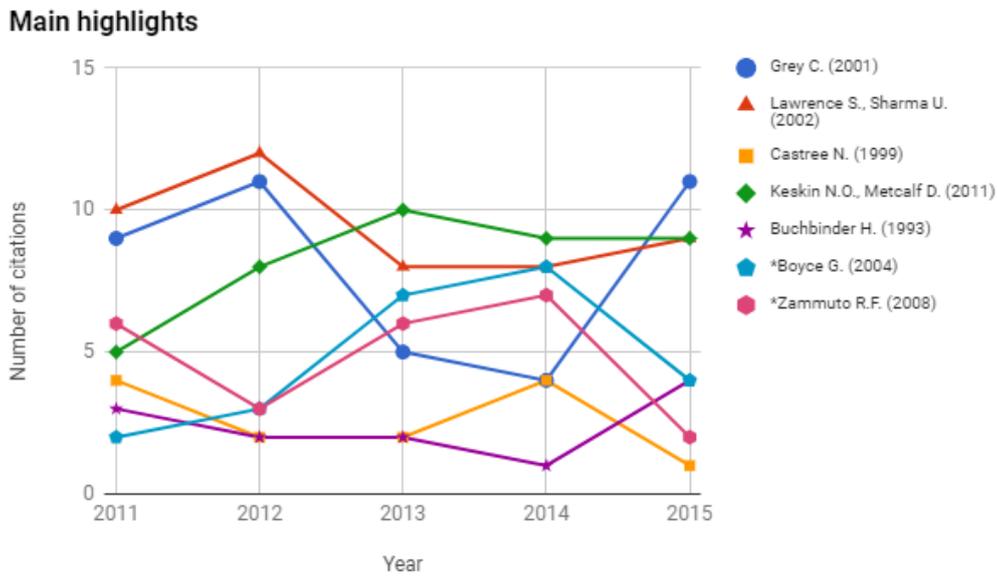


Figure 9 - Documents highlighted by the number of citations

Source: Prepared by the authors, based on the research data.

In relation to the network of cooperation between authors, it is possible to notice small communities formed. For reduction, only authors with three or more articles were considered. Figure 10 highlights the nodes by the amount of documents of each author; the width of the edges identifies a greater approximation between the authors, and the authors represented by purple nodes have a greater network of cooperation, not necessarily fully presented.

In this analysis, Dealtry, R. is the author with the highest number of documents, but with a small cooperation network. Already the authors Storey, J. and Taylor, S. have, mutually, the largest cooperation network.

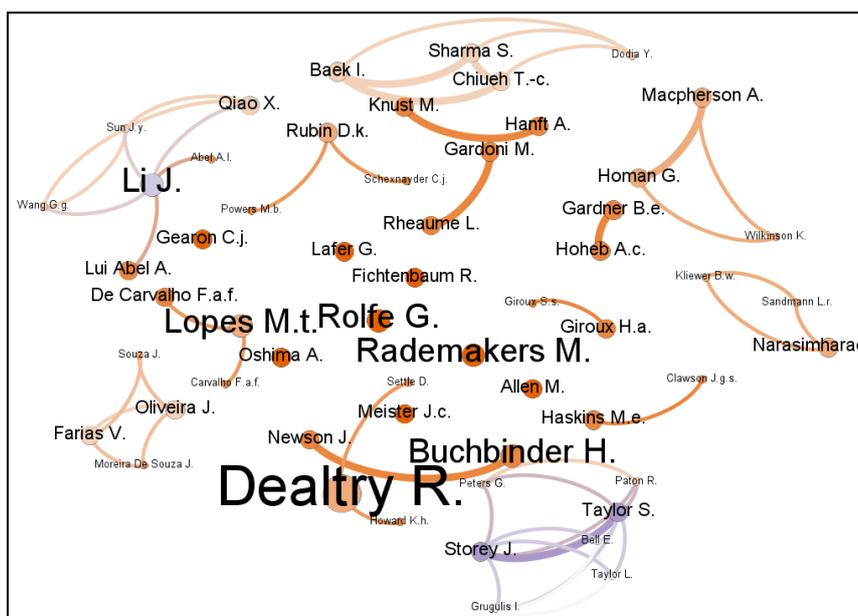


Figure 10 - Cooperation network between authors

Source: Prepared by the authors, based on the research data

Descriptive analysis

After the quantitative data analysis, the portfolio was qualitatively analyzed to explore the highlighted themes and topics, which portray the purpose of the use of technologies by the contemporary models of corporate university. In addition, a comprehensive analysis was carried out, categorizing the articles for the purposes of the use of the technologies. For this categorization it was used the revised Bloom's taxonomy (Anderson et al., 2001), which structure the cognitive process in six dimensions: (a) remember; (b) understand; (c) apply; (d) analyze; (e) evaluate, and (f) create. The categorization considered the action verbs used by the authors of the documents selected to define the interaction of stakeholders with technology at the Corporate University. Table 2 presents a synthesis of the main technologies found in the research portfolio.

The dimension (a) "**Remember**" is related to the relevant knowledge recovery processes such as facts and basic concepts (Krathwohl, 2002), with the purpose of recognizing and remembering. Cranch (1987) described the importance of integrating technologies into approaches involving hybrid activities between the corporate education system, the university, and the government.

After the beginning of the discussions on the integration of technologies, the "**remember**" dimension is the most addressed among the articles, in particular the virtual electronic learning environments and repositories. In Crocetti (2001), Learning Management systems (LMS) are considered as elements of the framework.

Among the researches on the use of electronic learning systems, Macpherson, Homan and Wilkinson (2005) observe a series of lessons learned by the "pioneers of corporate e-learning", including the evolution of the programs and the need to create an "organizational readiness". However, Macpherson et al. (2005) Consider that the advantages of an "on-line" pedagogy are not yet fully exploited, either by the limitations of technology or by other strategic priorities. Since then, several initiatives that make up e-learning as a base, integrate other technological elements, such as: user-centric design (Zachry, Cook, Faber, & Clark, 2001); dynamic learning networks (Romano & Second, 2009); and multiplatform access (Keskin & Metcalf, 2011). These cases are some of the topics discussed as being a differential for e-learning platforms.

The dimension (b) "**Understand**" is understood as a determination of meanings, which occurs by instructional messages such as oral, written and graphical communication. Therefore, there is an explanation about the possibilities of use of the material or ideas communicated, but not necessarily a relationship of implication for other materials. Therefore, the interpretation, classification, synthesis, selection and comparison, among others, are the purposes at this level (Krathwohl, 2002).

Table 2 - Classification of technologies by purpose

PURPOSE	TECHNOLOGIES	Authors
(a) Remember	E-learning	Crocetti, 2001; Mühlhäuser & Trompler, 2002; Gardner & Hoheb, 2005; Gould, 2005; Homan & Macpherson, 2005; Macpherson et al., 2005; Senthil Karthick Kumar & Md. Zubair Rahman, 2015
	Virtual Education programs	Luna-Amaya et al., 2016
	User-centered design	Zachry et al., 2001
	Dynamic Learning Networks	Romano & Secundo, 2009
	IT-based Human Resource Development (HRD)	Oshima, 2008b; a
	Multiplatform access	Keskin & Metcalf, 2011
	Technologies	Cranch, 1987
(b) Understand	Interaction strategies	Huijun & Fusheng, 2011
	Knowledge Media	Clinton et al., 2009
(c) Apply	Recommendation Systems	Allaho & Lee, 2014
	Ontologies	Farias et al., 2009
	Knowledge management and individual skills	Zuber-Skerritt, 2005
	Real-Time Learning Systems	Dealtry & Settle, 2005
(d) Analyze	Competitive Intelligence	Camelo et al., 2013
	Sector Learning Communities	Selby & Russell, 2005
	Social Networks	Smith, 2005
(e) Evaluate	Simulation and gamification	Freund & Mustaro, 2016
	Virtual Business School	Pantovic et al., 2008
	Computer-Supported Collaborative Learning (CSCL)	Sheremetov & Romero-Salcedo, 2003
(f) Create	Team-formation algorithms	Caetano et al., 2015
	Knowledge communities	Martin, 2011
	3D Learning Environments (3DLE), Personal Learning Environment (PLE), and Cloud Computing space	Elia & Poce, 2010
	Real-time multidisciplinary co-creative environments	Dealtry, 2005
	Project Characteristics for the CUs	Jansink et al., 2005
	Distance education and knowledge media proposed by the SU	Margherita & Secundo, 2009
	KM and KE tools proposed by the NCU	Freire et al., 2016

Source: Prepared by the authors.

At a next level is the dimension (c) "**Apply**", which refers to the abstractions of information in new, particular and concrete situations (Kratwohl, 2002). The research of Zuber-Skerritt (2005) provides a

model for the development of record management of knowledge and individual skills. Such a model presented is then composed by values and principles of research on the culture of an active learning and research-action. In relation to real-time learning systems, Dealtry and Settle (2005) suggest the application to quality control programs.

In this dimension of **application**, the registration and the representation of knowledge collaborate for the purpose of organizational performance, as presented by Farias, Oliveira and Souza (2009), which use ontology, in order to identify, share and present the Different knowledge of the stakeholders. Allaho and Lee (2014) also discuss the application of knowledge aided by a system of recommendation

In dimension (d) "**Analyze**", there is an explanation of the connections between ideas, because a "collapse" of communication in its constituent elements or parts for a general purpose (Krathwohl, 2002) occurs. Analyzing is one of the principles of competitive intelligence, which camel, wheat, Quoniam and Cardoso (2013) discuss as a guide to the studies of the stakeholders and perception of a broader view of organizational knowledge.

The analysis from the communities is also the research focus of Selby and Russell (2005), in which the authors identify them as "Sector Learning Communities". In their research, the chain of partners, educational institutions, students and the organizations integrate their knowledge into a dedicated web environment, called "Digital Media U" (DM-u). Research involving practice communities also seeks information from social networks. As Smith (2005), who examines the way networks, socialization among stakeholders, self-organizing systems and thought systems have influenced the communities of practice within the communities of competence, in addition to accompanying the Adaptability among the participants.

In dimension (e) "**Evaluate**" occurs a trial of the solution for certain purposes, beginning from criteria and standards (Krathwohl, 2002). This enables the individual to evaluate the initiatives as in gamification dynamics, thus addressing Freund and Mustaro (2016), which discuss the use of simulators in the most practical training, enabling the stakeholder to evaluate their actions and decisions.

Finally, it is in the dimension (f) "**Create**" that a junction of rearranged elements occurs in order to think of a functional whole (Krathwohl, 2002), there is then the production of a new or original work. In order to stimulate this creation, some authors address in different ways the synergistic interaction between the stakeholders during the joint formation. Caetano, Ferreira, Camilo-Junior and Ullmann (2015) study algorithms that help to form complementary teams in knowledge, to learn from each other. As well as Martin (2011), it presents the dynamics of the even virtual knowledge communities.

Elia and Poce (2010) discuss the relationship of Mobile Learning Environments (MLE) and 3D Learning Environments (3DLE) to a personalized environment (Personal Learning Environment – PLE), using cloud computing in a framework called "Future Internet Framework". The scope of this framework represents the key technologies of the moment, in a customized integration for the user.

The model described by Jansink, Kwakman and Streumer (2005) features 11 design features that collaborate for corporate universities to be knowledge-producing. Dealtry (2005) presents a model with the objective of providing a prospect of advancement on multidisciplinary environments in real time ("real-

time co-creative multidisciplinary environments"), which discusses infrastructure and sets of transferable skills, which enable new solutions for organizations.

The creation of new knowledge is perceived as the main product of the corporate university, from Margherita and second (2009) and Freire et al. (2016A). The SU model includes technologies of distance education and knowledge media; the NCU model demonstrates the interaction between stakeholders through the engineering and knowledge management tools, in a discussion involving the entire stakeholder network. In these models, technologies are fundamental mediating elements for the knowledge integration, obtaining, as a result, new knowledge.

Conclusion

Corporate universities represent a significant principle for innovation in organizations and the constant search for competitiveness. However, by analyzing the role played by technologies in the contemporary models of corporate university it is clear that resources are underutilized as merely communication tools, which are still little explored in order to provide a really collaborative and creative space.

This is because the subject of virtual environments and distance education is constantly explored in different perspectives for their ease of use and integration, without transcending their application to the development of network interaction.

Therefore, a structuring of the corporate university needs to explore new relationships with the expectation of generating value. Thus, other possibilities of the technologies are highlighted in the research with the greater purpose of generating knowledge.

Although new cognitive technologies and educational paradigms assist in the process, even common technological tools already allow the interaction between knowledge, in particular those that promote the virtual environment as a convergence of collective knowledge. This is perceived in the creation of interinstitutional teams and the tendency to develop interdisciplinary communities. Thus, the evolution of the models highlights not only a transfer or sharing of knowledge, but the need to generate new knowledge as the essence of innovation.

Given this, the objective of this research was to identify the purpose of the use of technologies by the contemporary models of corporate University: Stakeholder University and the Networked Corporate University (NCU).

For this purpose, a descriptive exploratory research was developed by means of an integrative review (Beyea & Nicoll, 1998). The methodological approach was quantitative, with bibliometric analysis, but also qualitative, with descriptive analysis of the objectives and purposes of the documents raised. From the objectives and key question, were defined as words of search the terms in English "corporate university" or, in the plural, "corporate universities", carrying out the due filtrations to approach the subject and established objectives, all previously explained in this work.

From the identified documents, there was a great ancestry of current studies in the area, since in the last decade there are more documents than in the previous 25 years. It was also identified that the research is related mainly to the areas of knowledge of the social sciences (39.1%) and of companies, business and

accounting (21.3%). On the other hand, in the area of Computer Science, only 5.7% of the documents on Corporate University (CU) are included in this field, representing the deficit of research that involve computer science and, consequently, the computation technologies for the CUs.

As for the mapping of documents by country, it was found that the United States takes the lead (with 70 documents), with superior performance to the UK (with 28 documents), followed by Australia and Canada, with 19 documents each. Therefore, it is possible to perceive greater popularization of research in the more developed countries.

The institutions with the largest quantity of articles published in the area are "Intellectual Partnerships Consulting Limited" (5 documents), "Swansea University" (4 documents), "Manchester Metropolitan University" (4 documents), "York University" (4 documents) and "Indira Gandhi National Open University" (4 documents).

As for the documents highlighted by the number of citations, Grey (2001), Lawrence and Sharma (2002), Castree (1999), Keskin and Metcalf (2011) and Buchbinder (1993) gain prominence. In addition to these, two documents are included that have gained notoriety in the last 5 years: Boyce (2004) and Zammuto (2008). When analyzed the cooperation network between the authors, it was found that, although Dealtry is the author with a greater number of documents, he has a small cooperation network. In their turn, authors Storey and Taylor have mutually the largest cooperation network.

After the bibliometric analysis, the portfolio was qualitatively analyzed to explore the highlighted themes and topics, which portray technologies as a tool for a purpose of NCU. An analysis was also carried out to categorize the articles by the purpose of using the technologies

By identifying the characteristics and tools, this research points to these new approaches of technological integration in mediation between stakeholders, which constitute a network interaction with a view to: (a) remember; (b) understand; (c) apply; (d) analyze; (e) evaluate, and (f) create, according to the Bloom's taxonomy (Anderson, Krathwohl, & Bloom, 2001), but especially to generate value, from these relationships.

Regarding the purpose of "Remembering" (relevant knowledge recovery processes), it was found that this is the most treated dimension by the articles identified in the integrative review, in their discussions on the integration of technologies, with a highlight in virtual electronic learning environments and repositories.

In the purpose of "Understanding" (interpreting, classifying, synthesizing, selecting and comparing), the recommendation of Clinton, Merritt and Murray (2009) is highlighted in relation to the careful selection of the media for the transfer of knowledge among the stakeholders, In order to achieve a competitive advantage. In addition to the indication of Huijun and Fusheng (2011) on integration strategies.

Related to the purpose of "Applying" (concerning the abstractions of information in new, particular and concrete situations), it was found that the research of Zuber-Skerritt (2005) provide a model for the development of record management of knowledge and of individual competences. Still, that Dealtry and Settle (2005) suggest real-time learning systems, and that would, Oliveira and Souza (2009) use ontologies.

In the purpose of "Analyzing", the authors suggest the learning communities, social networks and competitive intelligence.

Concerning the purpose of "evaluating" (judgement of the solution for certain purposes, beginning from criteria and standards) were identified the technologies of gamification, simulators, virtual business school and collaborative learning.

In the purpose of "Creating", the technologies of: algorithms, dynamics of the knowledge communities, mobile learning environments and the 3D environments for a custom environment, using cloud computing in a framework called "Future Internet Framework". In addition to the model described by Jansink, Kwakman and Streumer (2005), which have 11 design characteristics, and the model of Dealtry (2005), in which it is suggested the use of real-time co-creative multidisciplinary environments.

Returning to the central objective of this research, it turns out that the purpose of creating new knowledge is perceived as the main product of the Corporate Universities.

In this sense, it is concluded that distance education technologies, the knowledge media, and the management and engineering tools of knowledge emerge as empowering elements of the purpose of "Creating" technologies, to generate shared knowledge, storing them in the form of collective memory, besides promoting interaction and collaborative communication between the multiple stakeholders, in accordance with the models of SU and NCU.

Therefore, as future work, studies are recommended to understand how educational systems can appropriate the use of purposes and diversified technologies in the context of Corporate Universities to promote the knowledge sharing and the effective interaction of the stakeholders involved.

Reference

- Allaho, M. Y., & Lee, W. C. (2014). *Trends and behavior of developers in open collaborative software projects*. Paper presented at the 2014. *1st IEEE International Conference on Behavioral, Economic, Socio-Cultural Computing, BESC 2014*.
- Allen, M. (2002). *The corporate university handbook: Designing, managing, and growing a successful program*: AMACOM Div American Mgmt Assn.
- Anderson, L. W., Krathwohl, D. R., & Bloom, B. S. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*: Allyn & Bacon.
- Antonelli, G., Cappiello, G., & Pedrini, G. (2013). The Corporate University in the European utility industries. *Utilities Policy*, 25, 33-41. doi: <http://dx.doi.org/10.1016/j.jup.2013.02.003>
- Beyea, S. C., & Nicoll, L. H. (1998). Writing an integrative review. *AORN J*. Apr; 67(4).
- Boyce, G. (2004). Critical accounting education: Teaching and learning outside the circle. *Critical Perspectives on Accounting*, 15(4-5), 565-586. Retrieved from <https://www.scopus.com/inward/record.uri?eid=2-s2.0-2942659525&partnerID=40&md5=6f9252a8c7af5ce89be5e53afefc180c>
- Buchbinder, H. (1993). The market oriented university and the changing role of knowledge. *Higher Education*, 26(3), 331-347. doi:10.1007/BF01383490
- Caetano, S. S., Ferreira, D. J., Camilo-Junior, C. G., & Ullmann, M. R. D. (2015). A hybrid genetic algorithm for group formation at workplace. Paper presented at the *IEEE Congress on Evolutionary Computation, CEC 2015*.

- Camelo, C., Trigo, M. R., Quoniam, L., & Cardoso, J. C. (2013). Competitive Intelligence and the Development of Corporate Universities. *Competitive Intelligence and Decision Problems* (pp. 281-298): John Wiley and Sons.
- Castree, N. (1999). 'Out there'? 'in here'? Domesticating critical geography. *Area*, 31(1), 81-86. Retrieved from <https://www.scopus.com/inward/record.uri?eid=2-s2.0-0033041157&partnerID=40&md5=d77a303fb078892cdf990e8d6b7fec07>
- Chu, H.-C., Hwang, G.-J., & Tsai, C.-C. (2010). A knowledge engineering approach to developing mindtools for context-aware ubiquitous learning. *Computers & Education*, 54(1), 289-297. doi: <https://doi.org/10.1016/j.compedu.2009.08.023>
- Cifuentes, G. (2016). Conceptualizando prácticas de liderazgo de las TIC: Un estudio en la educación superior colombiana. Archivos Analíticos de Políticas Educativas, *aaape epaa*, 24 (100). <http://dx.doi.org/10.14507/epaa.24.2535>
- Clinton, M. S., Merritt, K. L., & Murray, S. R. (2009). Using corporate universities to facilitate knowledge transfer and achieve competitive advantage: An exploratory model based on media richness and type of knowledge to be transferred. *International Journal of Knowledge Management*, 5(4), 43-59. doi:10.4018/jkm.2009062903
- Cranch, E. T. (1987). Corporate Classrooms. Paper presented at the 1987 Proceedings - *Fourth International IEEE VLSI Multilevel Interconnection Conference.*, New York, NY, USA
- Crocetti, C. (2001). Corporate learning - A knowledge management perspective. *Internet and Higher Education*, 4(3-4), 271-285. Retrieved from <https://www.scopus.com/inward/record.uri?eid=2-s2.0-23644438908&partnerID=40&md5=f0802960cee8d9060ca114102f594a28>
- Crossan, m. M., Jane, h. W. & White, r. E. (1999). An organizational learning framework: from intuition to institution. *Academy of Management Review*, 24(3), 522-537.
- Dealtry, R. (2005). Achieving integrated performance management with the corporate university. *Journal of Workplace Learning*, 17(1-2), 65-78. doi:10.1108/13665620510574469
- Dealtry, R., & Rademakers, M. (2005). Corporate universities: driving force of knowledge innovation. *Journal of Workplace Learning*, 17(1/2), 130-136.
- Dealtry, R., & Settle, D. (2005). Integrating programme and process performance QA. *Journal of Workplace Learning*, 17(4), 255-267. doi:10.1108/13665620510597202
- Durkin, J., & Durkin, J. (1998). *Expert Systems: Design and Development*: Prentice Hall PTR.
- EBOLI, M. (2010). Fundamentos e evolução da educação corporativa. *EBOLI, Marisa et al. Educação Corporativa: fundamentos, evolução e implantação de projetos*. São Paulo: Atlas, 140-161.
- Elia, G., & Poce, A. (2010). Future trends for i-learning experiences *Open Networked "i-Learning": Models and Cases of "Next-Gen" Learning* (pp. 133-157): Springer US.
- Falagas, M. E., Pitsouni, E. I., Malietzis, G. A., & Pappas, G. (2008). Comparison of PubMed, Scopus, web of science, and Google scholar: strengths and weaknesses. *The FASEB journal*, 22(2), 338-342.
- Farias, V., Oliveira, J., & Souza, J. (2009). Knowledge management integrating organizational learning in a military context: The 3M model. *International Journal of Knowledge, Culture and Change*

- Management*, 9(1), 111-123. Retrieved from <https://www.scopus.com/inward/record.uri?eid=2-s2.0-77749340978&partnerID=40&md5=cf49475a64d2e3507e24335f9704c0ba>
- Freire, P. S., Dandolini, G. A., Souza, J. A., Trierweiller, A. C., Silva, S. M., Sell, D., & Steil, A. V. (2016a). Corporate university network: Initial considerations for a new model of corporate education. *Espacios*, 37(5), 1-1. Retrieved from <https://www.scopus.com/inward/record.uri?eid=2-s2.0-84964715461&partnerID=40&md5=de7b969adbb3ad6b8677cc8bc9a38f8e>
- Freire, P. S., Dandolini, G. A., Souza, J. A., & Silva, S. M. (2016b). Processo de implantação da Universidade Corporativa em Rede (UCR). *Espacios*, Caracas, 37(23), pp.1-22. Retrieved from <http://www.revistaespacios.com/a16v37n23/163723e2.html>
- Freire, P. S., Dandolini, G. A., & de Souza, J. A. (2017a). Implementation Process of Corporate University in Network (CUN). *International Journal for Innovation Education and Research*, 5(12), 101-126.
- Freire, P. S.; Dandolini, G. A. ; Souza, J. A. ; Silva, S. M. (2017b). Corporative University in Network: initial considerations towards a new model of corporate education. *International Journal of Development Research*, v. 7, p. 17207-17216.
- Freund, A., & Mustaro, P. N. (2016), Phabrika: Teaching financial techniques to sell through serious game. Vol. 445. *World Conference on Information Systems and Technologies, WorldCIST 2016* (pp. 199-208): Springer Verlag.
- Fu, Q.-K., & Hwang, G.-J. (2018). Trends in mobile technology-supported collaborative learning: A systematic review of journal publications from 2007 to 2016. *Computers & Education*, 119, 129–143. <https://doi.org/10.1016/j.compedu.2018.01.004>.
- Giroto, C. R. M., Poker, R. B., & Omote, S. (2012). As tecnologias nas práticas pedagógicas inclusivas. *Marília: Cultura Acadêmica*. Retrieved from https://www.marilia.unesp.br/Home/Publicacoes/as-tecnologias-nas-praticas_e-book.pdf
- Grey, C. (2001). Re-imagining Relevance: A Response to Starkey and Madan. *British Journal of Management*, 12(SPEC. ISS.), S27-S32. Retrieved from <https://www.scopus.com/inward/record.uri?eid=2-s2.0-0035731957&partnerID=40&md5=6aa6b358ce05af80f20ca16e6222b8df>
- Huijun, N., & Fusheng, W. (2011). Development model choice and strategy interaction in Corporate Universities. Paper presented at the 2011 *IEEE 3rd International Conference on Communication Software and Networks*, ICCSN 2011, Xi'an.
- Jansink, F., Kwakman, K., & Streumer, J. (2005). The knowledge-productive corporate university. *Journal of European Industrial Training*, 29(1 SPEC. ISS.), 40-57. doi:10.1108/03090590510576208
- Keskin, N. O., & Metcalf, D. (2011). The current perspectives, theories and practices of mobile learning. *Turkish Online Journal of Educational Technology*, 10(2), 202-208. Retrieved from <https://www.scopus.com/inward/record.uri?eid=2-s2.0-79955162378&partnerID=40&md5=671203b03173923786f16cca20a17116>

- Krathwohl, D. R. (2002). A Revision of Bloom's Taxonomy: An Overview. *Theory Into Practice*, 41(4), 212-218. doi:10.1207/s15430421tip4104_2
- Knowles, M. S. (1973, 1990). *Do aluno adulto: uma espécie negligenciada*. 4ª ed. Houston: Gulf Publishing.
- Lawrence, S., & Sharma, U. (2002). Commodification of education and academic labour - Using the balanced scorecard in a university setting. *Critical Perspectives on Accounting*, 13(5-6), 661-677. doi:10.1006/cpac.2002.0562
- Lui Abel, A., & Li, J. (2012). Exploring the corporate university phenomenon: Development and implementation of a comprehensive survey. *Human Resource Development Quarterly*, 23(1), 103-128.
- Macpherson, A., Homan, G., & Wilkinson, K. (2005). The implementation and use of e-learning in the corporate university. *Journal of Workplace Learning*, 17(1-2), 33-48. doi:10.1108/13665620510574441
- Margherita, A., & Secundo, G. (2009). The Emergence of the Stakeholder University *Open Business Innovation Leadership: The Emergence of the Stakeholder University* (pp. 170-207). London: Palgrave Macmillan UK.
- Margherita A., & Secundo G. (2011) The stakeholder university as learning model of the extended enterprise, *Journal of Management Development*, 30(2): 175-186.
- Martin, F. (2011). Lafarge develops employee talent through e-learning. *Industrial and Commercial Training*, 43(5), 291-296. doi:10.1108/00197851111145880
- Meister, J. (1998). *Corporate universities: Lessons in building a world-class work force*: McGraw-Hill Education.
- Narasimharao, B. P. (2009). Knowledge economy and knowledge society - Role of University outreach programmes in India. *Science, Technology and Society*, 14(1), 119-151. doi:10.1177/097172180801400105
- Pacheco, R. C. d. S., Sell, D., Steil, A. V., Ceci, F., Fernandes, V., & Andreoli, C. V. (2015). The Sanitary and Environmental Engineering Journal in the Brazilian Science, Technology and Innovation System. *Engenharia Sanitaria e Ambiental*, 20(1), 1-16.
- Romano, A., & Secundo, G. (2009). *Dynamic learning networks: Models and cases in action*: Springer US.
- Rowlinson, M., Booth, C., Clark, P., Delahaye, A., & Procter, S. (2009). Social remembering and organizational memory. *Organization Studies*.
- Schreiber, G. (2000). *Knowledge engineering and management: the CommonKADS methodology*: MIT press.
- Selby, L., & Russell, D. (2005). Curriculum design and management in the Digital Media U. Applying the corporate university concept to a business sub-sector. *Journal of Workplace Learning*, 17(1-2), 24-32. doi:10.1108/13665620510574432
- Smith, E. A. (2005). Communities of Competence: New resources in the workplace. *Journal of Workplace Learning*, 17(1-2), 7-23. doi:10.1108/13665620510574423

- Spitzer-Hanks, D. T. (2016). Process-model feminism in the Corporate University. *Gender and Education*, 1-15. doi:10.1080/09540253.2016.1166180
- Studer, R., Decker, S., Fensel, D., & Staab, S. (2004). Situation and perspective of knowledge engineering. *Knowledge Engineering and Agent Technology*, 52, 237.
- Vygotsky, L. S. (2007). A formação social da mente. 7. ed. São Paulo: Martins Fontes.
- Yeh, Y.-c., Huang, L.-y., & Yeh, Y.-l. (2011). Knowledge management in blended learning: Effects on professional development in creativity instruction. *Computers & Education*, 56(1), 146-156. doi:<https://doi.org/10.1016/j.compedu.2010.08.011>
- Zachry, M., Cook, K. C., Faber, B. D., & Clark, D. (2001). The changing face of technical communication: New directions for the field in a new millennium. Paper presented at the SIGDOC 2001: Special Interest Group for Documentation Proceedings of the 19th Annual International Conference on Systems Documentation Communication in the New Millenium, Santa Fe, NM.
- Zammuto, R. F. (2008). Accreditation and the globalization of business. *Academy of Management Learning and Education*, 7(2), 256-268. Retrieved from <https://www.scopus.com/inward/record.uri?eid=2-s2.0-61849155755&partnerID=40&md5=f25591fdccd792e94d9b579e666fca50>
- Zuber-Skerritt, O. (2005). A model of values and actions for personal knowledge management. *Journal of Workplace Learning*, 17(1-2), 49-64. doi:10.1108/13665620510574450